

POTENTIAL APPLICATION OF BLACK GOJI BERRY (*LYCIUM RUTHENICUM* MURRAY) IN 3D PRINTING OF FUNCTIONAL FOODS

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Abstract

Common berries such as blueberry (*Vaccinium spp.*), raspberry (*Rubus idaeus Linnaeus*), cranberry (*Vaccinium oxycoccos L.*), bilberry (*Vaccinium myrtillus L.*) and Goji berries (genus *Lycium*) are widely recognized as beneficial to human health due to their high content of vitamins, minerals, and phytochemicals. These compounds have been shown in various studies to promote health and protect against diseases.

Lycium ruthenicum Murray, also known as Black Wolfberry or Russian Box Thorn otherwise known as Black Goji berry, is a close relative of the classic red Goji berry. It is an edible species of nightshade native to the semi-arid regions of Central Asia.

Black Goji berries (*Lycium ruthenicum* Murray) are particularly rich in functional phytochemicals such as anthocyanins and polysaccharides, which have demonstrated antioxidant and protective effects in numerous studies. Their bioactive properties align with the known functions of polyphenols and functional polysaccharides. These characteristics suggest potential applications in the development of food additives or functional foods, particularly in the food industry and in personalized 3D-printed food products.

The aim of this study was to determine the bioactive potential of dried Black Goji berries as functional ingredients for producing 3D-printed functional desserts. Molecular absorption spectrometry was used to quantitatively determine carotenoids and anthocyanins. Gas chromatography combined with mass spectrometry (GC-MS) was employed for analyzing polysaccharides, while organic acids were analyzed using liquid chromatography (LC).

Results showed that dried berries are notably rich in carotenoids (1.7 g/100 g DW), anthocyanins (28 g/100 g DW), polysaccharides (36 g/100 g DW) and organic acids (4.9 g/100 g DW).

In conclusion Black Goji Berry (*Lycium ruthenicum* Murray) possess strong antioxidant properties and add significant nutritional value to 3D printed food products. With their vibrant coloring properties and delicately sweet, berry-like flavor, Black Goji berries show great potential as an ingredient in 3D printed desserts. However, current research is insufficient to confirm their safety for such applications, and also, further clinical studies are necessary.

Keywords: 3D printing, bioactive compounds, Black Goji Berry (*Lycium ruthenicum* Murray), functional food

This research was funded by Karlovac University of Applied Sciences through an internal project: Nutrition Innovative three-dimensional 3D-desserts (**HRID**).